

The 50 MHz DX Bulletin

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Subscription Information

The 50 MHz DX Bulletin was founded by Harry Schools KA3B, is edited by Shel Remington NI6E/KH6, and is published by Victor Frank K6FV. Issued at irregular intervals as frequently as possible, it is dedicated to the understanding and utilization of long-distance propagation in the 6-meter Amateur band. Annual airmail subscriptions cost \$20.00 in the US; US\$22.00 in Canada; US\$25.00 elsewhere. Make subscription remittances payable to Sheldon Remington and send to P. O. Box 1222, Kaaau HI 96749, U.S.A. Send reports to the editor via mail or telephone 808-982-5800 between 2000-0800 UT. This Bulletin may be freely quoted, provided that credit is given. All dates and times are Universal Time, and given in ISO/ANSI sequence: year/month/date/time.

News Of World 6m Distance Records

Various keepers of records are now maintaining separate records for short-path and long-path geometries. In both categories, the previous world records appear to have been shattered in the past month.

In the short-path department, a QSO between ZL1ANJ and ZB2BL on 1992 April 1 at 2005 was very nearly antipodal. A crude (spherical-earth) calculation by your editor indicates that this path slightly exceeds the 10 year old record between JH5HTP/6 and PY5BAB/5. A final determination will be made by Bill W3XO/5, who has software which accounts for the oblate shape of the planet.

In the long-path category, Ken JA3EGE, who recently honored your editor with a visit, states that the previously-mentioned (in these pages) JA-OE and JA-VE6 long paths are simply typos and did not take place. Meanwhile, on 1992 March 15 at 1203, your editor worked KP4BZ via L-P, a path distance of some 30,741 km (19,103 U.S. miles). To the best of my knowledge, this substantially exceeds any previous L-P distance ever worked on 6m; it is 77% of a complete circumference of the globe. The one "heard" report of longer distance is the VS6SIX/b reception by your editor on 1991 November 5 at 1844-1902, which is 46 km longer, but no QSO was made. As stated before, L-P distance can be calculated simply by subtracting the S-P distance from the circumference of the planet. There is strong empirical evidence that L-P circuits much in excess of the above 77% are highly unlikely at 50 MHz. But, as with the short-path record, the opportunity certainly exists for small upward increments in the world record. This will inevitably require a station at one end of the path to stay up very late at night; the above record QSO occurred at 2:03 am local time in Hawaii!

I'm not aware of any formal 6m QRP records being kept, but this year has seen UL7GCC running 100 milliwatts for a contact with OH2BC, and PY5CC ran 50 milliwatts recently and worked SV1DH!

The Next Few Years of 6m F2

Propagation has been plentiful in the first 4 months of 1992, as illustrated by the above, but *operating* activity in some sectors has been decreasing. Nobody would disagree that the smoothed sunspot counts are gradually declining, and have been since 1989. Yet 1991 was universally acclaimed as the best year ever, both in spring and fall. Now some pundits in high places are continuing, as they did two years ago, to proclaim that the 'end is near.' Just like Chicken Little, "the sky is falling, the sky is falling." It would appear that these proclamations, coupled with the lingering vestiges of the Flux-Cult, are convincing some operators to shut down their 6m rigs until Cycle 23 (or until Es season). More and more we hear reports on 28885 of beacons such as WB4OSN and K6FV being copied loudly at great distances, and *nobody's home*.

Maybe part of the problem is that a few highly-visible old timers, now that they've got their DXCC certificates on the wall, feel that they've worked practically everything that they can ever work on 6m. So the great excitement that might've accompanied, say, a VK-to-W5 opening in past years, has been replaced by a complacency which is noticeable on 28885. **DO NOT MISTAKE THIS FOR A LACK OF HOT PROPAGATION!** And do not mistake it for a lack of possibilities for ferreting out something rare: every month some new countries become active on 6m, as shown in these pages. This season has seen plenty of DXpeditions, and that will hopefully continue in the months and years ahead. But if some "expert" tells them it's all over for Cycle 22, then they're not going to waste their time, money, and energy going to Irian Jaya. And *that* will kill off Cycle 22 activity.

Let's look back at Cycle 21—hot long-haul DX aplenty was being worked well into 1984, at least. Projecting that onto the present cycle, we should have no less than 2 or 3 good years remaining of 50 MHz F₂. TEP will continue even longer, indeed many of us now realize that TEP (with E_s extension) is available even at sunspot minima. If a few paths failed to produce much good F₂ in early 1992, it can be blamed on the prolonged geomagnetic quiet, rather than on anything related to the solar flux.

So pilot your own ship, dear reader, and pay no heed to anyone who tells you you can't work any more DX. It's not over until it's over, and that won't be anytime soon!

GRID FIELDS versus DXCC COUNTRIES

As noted before in these pages, DXCC countries are unevenly distributed around the planet. This is even more true for countries which have 6m activity. It may not matter so much on the "DC" bands, where propagation is not the limiting factor in country-chasing. But on 6m one's ease in working new countries is directly proportional to the quantity of one's propagation to the "gold mines" of Europe and the Caribbean. A DXer in a prime spot like Morocco can work more countries in one year than can be worked in a lifetime, with the same effort, from KL7 or

VE7. It's even possible to work 100 countries on 6m without ever exceeding a distance of 5000 miles (8000 km). So one's standings in the country count cannot be used fairly as a measure of one's DX skills and station effectiveness.

This problem can be rectified if we switch over to standings based on Grid Fields. This is a system whereby the earth is divided into blocks of 10 latitude degrees by 20 longitude degrees. It just so happens that there are 324 such Fields on the planet, a number that is coincidentally almost identical to the current number of DXCC countries. So our measuring stick has the same length, only it is linearly subdivided instead of nonlinearly.

The VUCC (100+ grid squares) award program has added a new fun element to contesting and DXing on 6m. But confirming 700+ squares can be prohibitively expensive for some operators, and VUCC also suffers from the fact that one's count is not truly indicative of *long-distance* success.

An excellent booklet entitled 'The ARRL World Grid Locator Atlas' is available for US\$5.00 postpaid from the ARRL, 225 Main St., Newington CT 06111. I'm sure it is also sold by other national societies. It ought to be in every 6m DXer's shack. In addition to its obvious uses for chasing grid squares and for determining coordinates so that azimuth and distance calculations can be made, it has a world Field map and a discussion of the Field concept.

Note that anyone who tells you their grid square is also telling you their Field, because the Field is simply the first two digits of the grid square. A station whose locator is GG54 is in the GG Field. This means anyone who has been keeping track of their grid square count can, in a few minutes, determine their Field total. In fact, the official forms used for VUCC applications are organized into two Fields per page.

To the best of my knowledge, no station has worked more than about 88 Fields on 6m so far. So there is a potential horse-race for 100 Fields, akin to the recent race to DXCC. As yet there is no specific Field Award, but at least one of the UKSMG 6m awards does use Fields as a component of the scoring. I would like very much to see a 100-Field Award for 6m, and if something like a plaque or silver cup (remember the Milwaukee cup for the first inter-continental 5m QSO?) were offered, it would significantly increase worldwide DX activity far into the future. This could be offered by SMIRK, UKSMG, ARRL, IARU, or even a local club, manufacturer, or individual. The full support of this Bulletin will be available to publicize such a program.

Personally, your editor is just as thrilled, if not more so, to work a new Field as to work a new DXCC country. Does anyone else feel the same way? If readers will send me (NI6E) a list of Fields they have worked, I will merge them with mine and publish a list of Fields that have ever been activated.

Incidentally, my request last September for similar lists of DXCC countries ever worked drew only one response (W5FF); doesn't anyone want to see a master list of countries ever worked (and approved by the DXCC desk) on 6m? The offer is still open...

DXCC NEWS

DXCC Award News: The DXCC desk has announced that applicants who send their cards directly to ARRL HQ no longer have to list data from their QSL cards on the back of the application form. The backlog is currently about 4 months for new applications. More than fifty 6m certificates have already been issued to operators on every continent except Africa, where ZS6WB is now up to 88/83.

On a separate matter, a prominent W station, while vacationing overseas, was heard arranging for another operator to go to his shack and work the DX using the vacationer's call sign (and this wasn't the first time). This is a flagrant violation of DXCC rule 10, not to mention FCC rules, and it casts a long shadow over the supposed first west-coast 6m DXCC award.

Non-DX Contest News

SMIRK Party #17 has been announced for June 20 0000z until June 21 2400z (48 hours). Exchange call sign, SMIRK number, and grid locator. Multi-Op entries are allowed; cross-band or partial QSOs are not allowed. All contacts between the contiguous 48 states must be above 50.125 MHz. Score 2 points for each SMIRK contact and 1 point for each non-SMIRK contact. Add the total SMIRK score and the total non-SMIRK score, then multiply by the total number of grid squares worked. Certificates will be issued for the highest score in each geographical division, as follows: W/VE=section; JA=prefecture; VK/ZL=state; G=shire-county-Scottish region, etc.; others=country. Only paid-up SMIRK members qualify for awards. Otherwise enclose \$6, payable to SMIRK. Entries must provide name, call, and SMIRK number. Check logs or dupe sheets are not required; official log sheets can be obtained for a business-size SASE to Contest Chairman W5OZI. Send contest entries, postmarked no later than July 6, to: Pat Rose W5OZI, P.O.Box 393, Junction TX 76849 USA.

The annual ARRL 50 MHz Spring Sprint will take place from May 23 2300z until May 24 0300z (4-hour duration). Usual ARRL VHF/UHF contest rules apply. Exchange grid squares. The score is simply the number of valid QSOs multiplied by the number of grid squares. Official entry forms, available from ARRL HQ for as SASE, are recommended. Logs must indicate time, call sign, and complete exchange, and multipliers must be clearly marked. Entries should be sent to ARRL, and postmarked no later than June 24. Results will appear in the National Contest Journal.

This space is available for announcements of other regional 6m contests year-round. We know such contests exist in Japan, Australia, New Zealand, South Africa, and elsewhere, and it would be nice to have some advance details.

SMIRK Memorial Rig Donation Program

Ray Clark K5ZMS would like to remind 6m DXers that even though you might become a Silent Key sometime down the road, it is possible to keep your spirit alive on 6m through the equipment loan program. SMIRK places a memorial plaque on equipment that is donated to the Klub when they become a silent key. In this way, the recipient is aware of whose rig it used to be, and by talking to operators who knew the donor, will gain knowledge of that person. So even when it comes time to go, your equipment will live on for you! SMIRK has just shipped the Memorial FT620B rig of Silent Key and SMIRK co-founder Bill Moore K5OOG/N5EJG to the Honduran ARC for use in that country.

NEWS OF OCEANIA:

Cocos (Keeling): Fritz VK9CK has been running a keyer on 50.0722, sending 'VK9CK/B IN NH87LX' at about 30 wpm. He says that the keyer should be broken by calling on 50.110. However, if he is on the satellites, he won't be monitoring 6m.

Guam: At presstime, KH2/J11DMH is active on 6m, especially 50.115. No further details.

Hawaiian Islands: Stations awaiting a QSL from NI6E/KH6, please be patient. I have used up my supply, and more are on order, but it may be awhile yet.

Norfolk Island: Jim VK9NS was heard stating that his 6m gear was stuck in Bhutan, so he cannot operate 6m at this time... 'it's a pity, really.' Bob VK9ND has not been reported since last year.

Palau: Some 6m results of the KC6RR operation a month ago: a total of 2759 contacts were made with 1588 stations. Most of these were with Japan, but 135 VK's were worked in all states except VK7, plus 21 other countries in all continents except North America. However, there was propagation to North America on at least two occasions: on March 4 at 2300-2352, the KC6 voice keyer was copied by numerous southern W6's, and on March 8 around 1330, some KP4's were heard by KC6RR during a long-path opening into P43 and PJ2. Other exotic catches included Mongolia, China, and Malawi; the only European was SV1OE.

Papua-New Guinea: Pete P29CW continues quite active on 6m, with 25 countries in the log, plus the first known P29 long path (reception of ZD8/b). He runs an IC726 into a SMIRK-loaned 100-watt T-E Systems amplifier, and at some future date, he may modify a 4-400 HF linear amplifier for 6m. He has two unusual antenna systems: a topped Bobtail Curtain (beaming 5/185 degrees) and a stacked pair of 4-element quads (which have dual driven elements like a ZL Special). Pete monitors 28885 whenever he's available. As indicated by his callsign, he prefers CW; he also holds callsigns WA6VDF and VK3AMX--he's a Sacramento native. His QTH is Q123wq in the Eastern Highlands. QSLs go to Pete Linden at P.O.Box 461, Ukarumpa via Lae, Papua-New Guinea. Pete's successes have inspired Paul P29PL to put up a 6m beam at his new QTH, into which he runs up to 100 watts. Paul's QSL route is via VK9NS. Gordon P29ZGD has also been heard on the band this season.

Rotuma: The TS600 (provided by VK3OT) and the brick (provided by 3D2PO) arrived on March 20, and were put on the air by Antoine 3D2AG within hours. Some initial trouble with the 100-watt brick was resolved, and Antoine repaired the old 5-element yagi left on the island by Bing 3D2XV and got it up 20 feet. Antoine has been quite active and successful in his first two weeks on 6m here, working 9H, ZP6, TI, YS, ZF, XE, W5, W6, KH6, ZL, VK, JA, etc. He is a fine operator with CW as well as SSB, primarily using 50.115, and he has been liaising on 28885. He will return home to Suva at the beginning of May. The grid is RH87. QSLs go to his home address: Antoine Nyeurt, Box 14633, Suva, Fiji Islands.

Tokelau: Kerry ZL2TPY is now expected to be on the air from about May 8 to May 26 as ZK3TPY. He will probably be on Nukunono atoll (AI40), which was also the site of Kiyoko's 1990 6m activity. The rig will be an IC575H (100 watts), a 5-element M² yagi with a rotator on a 20-foot

mast, a Mizuho hand-held for listening on 28885, 100 peak watts of photovoltaic panels, and a 350-watt Honda alternator. Note that Kerry is not allowed on 10 meters, nor does he operate much CW. He is bringing along a 27 MHz transceiver with which can liaise with WA6BYA, so ask Bob for updates if necessary. Kerry has designated 50.1475 as his primary operating frequency, and if he encounters a heavy pileup he'll listen (split) 50.150-160. Presumably when he has propagation but no takers, he'll also CQ briefly on 50.110, and he also sometimes uses 50.123. In the absence of a daytime F₂ path, western U.S. stations should keep watch around local midnight for the TEP path. QSLs go via JA1VOK, and donations would be appreciated.

Tuvalu: Ian T20AA has suffered some damage to his 6m yagi, but he has been getting on with an HF vertical, mostly in the evenings. Tnx P29CW.

Vanuatu: Graham ZL4LB is back in Vila, this time for a 2-year stay as YJ8LB. When he operated for 3 days in 1990 as YJ0ALB, he made 130 QSOs on 6m. His rig is a bare-foot IC726, running 10 watts into a 5-element beam. His QSL address is P.O.Box 1147, Port Vila, Vanuatu. Graham also says that Simon YJ8GP's antenna suffered a broken driven element in a March storm. Simon did make a few contacts with a dipole on March 29, but his long-term status is uncertain. Also, your editor has finally identified a heavily-used, high-power English-speaking FM telephone link on 48.85 MHz as being located in Vila. That gives us two good reasons to keep this frequency in our scanners, the other being the offshore Ecuadorian repeater.

Western Kiribati: Jack T30JH is back in Australia, but in August he will return to Tarawa (and he might even get to T31!!). The IC551 has been returned to VK8ZLX; it is unknown whether a 6m rig can be found for the August period. Jack's log for the March operation shows 536 QSOs in the following countries: JA (all districts), VK (all states), VK9CK, V73AT, P29, 3D2, 3D2AG, KH6, KH7, and he heard VS6, V63, and W6. Tnx VK3OT. QSLs go to Jack Haden, Box 299, Ryde, NSW 2122, Australia. Tnx ZL1MQ.

Western Samoa: Kerry ZL2TPY was held over here longer than expected whilst awaiting the boat to Tokelau, so he activated 6m for a couple weeks as 5W1KF. He worked ZS6WB via long-path, plus W6, V3, TI, HK4, ZP6, KH6, V73, 3D2, T2, ZL, VK, P29, JD1o, and JA, at least. He heard the ZD8/b via L-P, and also heard YS1 and VS6. QSLs go to ZL2TPY. He and VK3OT may conspire to leave some 6m gear in Apia, if a suitable host station can be found.

NEWS OF ASIA

Asiatic C. I. S.: More on EK0JA: the weekly scatter operation occurs on Saturdays, not Sundays, at 2000-2200. He now has a KW amplifier; the grid is PN53. It has been announced that the local R-1 TV transmitter is occasionally off the air all day for scheduled maintenance, and that EK0JA will be available on those occasions for 6m activity. One such event occurred from April 19 2000 until April 20 0700, during which he worked VK8ZLX, VK3OT, and possibly some JA's. All of his transmissions are on 50.100, and he listens for replies on 50.150. Tnx JA1BK, who manages EK0JA QSLs for 6m QSOs only. At presstime, a rumor is circulating that EK0JA is not properly licensed for 6m.

A separate operation occurred, with no advance notice, on April 20 from Khabarovsk (PN78). The callsign was RZ0CZZ, operated by Yoshi JA1UT, to whom the QSLs should be sent. He worked many VK's plus KG6DX.

The 6m rig was taken over by resident ops after Yoshi departed, using the callsign UZ0CWW. Khabarovsk is some 700 km north of Vladivostok, and 270 km from the nearest listed 49.75 MHz R-1 TV transmitter at Komsomolsk. This means that 24-hour operation is possible, unlike EK0JA. The rig is a TS690 running 50 watts into 5 elements, and all operation thus far has been split-frequency, transmitting on 50.125 and listening up ten. The QSL route for UZ0CWW is unknown as yet.

Finally, GJ4ICD reported hearing UA9ZB giving his square on January 29 about 1050, during a strong opening to UL7GCC. No further details.

China: One of the nice catches by KC6RR was BT5WOS, on March 11 at 1212. The operator is Toshi (JH4GJR), who evidently works there. His rig is a TS670 running 50 watts into 5 elements. Tnx W0RRY.

Cyprus: Ian 5B4YX has been quite active on 6m. He requests that those wishing to QSL via bureau do so via his son G0KKT, and that direct QSLs should go to Ian Osborne, Blakelow, Old Paphos Rd, Episkopi, Limassol, Cyprus. Tnx G4UPS.

Kampuchea: Eric F1JKK will go to XU to work with the U.N. in November and will be QRV on 6m. Tnx GJ4ICD.

Kuwait: Don Nutt 9K2WR (home call KJ6TC or JC?) and Bob 9K2ZR (home call WA8MOA) are now quite active, and they are there for at least a year. In their first week on 6m, they worked LU, ZP, PY, 9H, V5, ZS9, ZS6, 7P, A2, Z2, 7Q, FR5, VQ, 4S, JA, JD1o, KH2, P2, VK6+8, and YB. Their Swan 250's CW was reportedly drifty and chirpy. QSLs for 9K2ZR go via K8EFS, and for 9K2WR it's via his XYL N6UXB: c/o Amy Nutt, 5005 Willow Rock Way, Sacramento CA 95841-4912, USA. 9K2USA is the club call, but apparently 6m QSOs are not being made with that call.

Lebanon: Samir OD5SK has asked that QSLs go via his manager KB5RA. Tnx G4UPS.

Maldives: 8Q7HP and the various other JA DXpeditioners here in March made it as far west as Jersey and Malta, and east into JA and VS6. 8Q7HP QSLs go via JA1OEM.

Mongolia: The JT1CO keyer is often reported by VK's on 50.1004, but they report that usually no JT comes up for QSOs when the keyer is shut off. KA3B has sent a 1991 Beacon List, and we are sending a sample copy of this Bulletin to N. Khosbayer JT1CD, who is the chief of the Central Club Station JT1KAA of the Mongolian Radio Sports Federation, P.O.Box 639, Ulaanbaatar-13, Mongolia, Asia. JT1KAA has an FT655 and 6-element CL6DX yagi, donated in 1991 by JA1UT and friends. JT1CD says, 'we are unexperienced in working 50 MHz,' and so we hope they will check in on 28.885 MHz for some advice.

South Korea: Gary HL9TG has been active on 6m recently, especially around 1100, running an IC551 and amplifier into a 10m beam. Tnx P29CW. Others are sharing his station, such as Joe HL9JBT (N7RQD). Also active in April are HL1EJ, HL1JQ, and others. Tnx KG6DX.

Sri Lanka: The 4S7/JA1OEM operation here in late March worked little, if anything, outside of JA. Too much super-glue on the rotator, perhaps? The good news is that 4S7AVR was reported by GJ4ICD on March 10 at 1030.

Thailand: On April 4 at about 0500, HS4AK showed up on 6m and worked many JA's on 50.110. No further details

are yet available on this station, but hopefully he'll be back!

Turkey: Eric TA9/F1JKK is active here on 6m and 2m until about July. QSL via F6FNU. Tnx GJ4ICD.

NEWS OF NORTH AMERICA

Belize: Don V31PC has returned to 6m after having been off since late 1990. His National RJX-610 had failed, and was transported back to the U.S. for repairs; he got it back only recently. He runs about 10 watts to a 3-element beam, and does quite well with that. A small amplifier has been shipped from California and will probably be in Don's hands shortly. QSL info: Don Owen-Lewis, P.O.Box 7, Punta Gorda, Belize. Incidentally, W1AW advises that the Belize QSL bureau is no longer in existence.

Canada: Brian WA8MZQ will be on Manitoulin Island, Ontario again this year on July 16 through August 1, from grids FN06, EN85, 86, and 96. When on 6m he will especially be on 50.125-.130 around 1030-1130z, and at other times he will operate between 50.125 and 50.150. Liaison will be available on 7.163 MHz±, and details will also be given on the 3.843 VHF net at Tuesday 0100z (Monday evenings 2100 ET). Brian would like to make skeds for 6 and 2m; he can be reached before departure in the evenings at 513-599-5335. The station will run 300 watts into a 4-element yagi. An article describing his similar grid-pedition in 1991 appeared in QST Canada for April. QSL to L. Brian Snyder, 4415 Holiday Lane, Bellefontaine OH 43311.

Clipperton: No QSLs or logs have yet been circulated, but they did say they worked 300 stations on 6m, from all continents except Europe. We did manage to get the following list of the 10 JAs who made it into the FO0CI log in the one frantic forward-scatter opening around 0350 on March 12: JA4MBM, JR6HI, JR6WPT, JG2BRI, JH4IUO, JR6UDM, JR6VIP (sic), JH4JPO, JA5THU, and JR6KJL.

Dominican Republic: Aki JA5DQH has returned to Japan after a very successful operation as HI8A. QSLs should now be sent only to his home address: P.O.Box 73, Ishii, Tokushima 779-32, Japan, or via the JARL bureau. Tnx TDXM via KA3B.

Greenland: Bo OX3LX (OZ1DJJ) is back in Denmark, and he reports only two contacts made during his stay in Greenland. These were locals: OX3LK running 10 watts into a dipole, and OX3CS running 50 watts into a vertical. OX3CS is located near the OX3 beacon. Tnx G4UPS.

Grenada: ZP6CW provides this QSL route for Robbie J39GM: P.O.Box 737, St. Georges, Grenada. Tnx Doug. Jim J37AE (AF5J) departs Grenada on April 17, but will return again in November to J3 for another winter. ZL1MQ gives J37AE's QSL route as: James Langdon, Philatelic Dept., PostOffice, Sauteurs, Grenada, Windward Is.

Guantanamo Bay: Doug KG4DD was active here in March, running 10 watts into a dipole; his contacts can be QSLed via N5FTR. Doug departed on March 31, but the 6m rig will stay there at the Guantanamo A.R.C. station, and a 4-element beam is being sent by DX Engineering. KG4CO will be active on 6m here until July. Tnx WF9X, AA6TT, and W1AW.

Guatemala: Juan TG9AJR is imminently expecting arrival of a Swan 250 shipped by W4DR and WB4DBB. Steve TG9AWS will be out of the country for awhile, but he is supplying Juan with a 6-element yagi.

Haiti: Pat HH2PK has been active in April, working VKs on 6m SSB and CW. He gives his grid as FK28 (same as HH7PV), and his QSL address as P.O.Box 1095, Port-au-Prince, Haiti. Tnx VK3OT.

Pat HH7PV has been heard vainly trying to contact his QSL manager Art Hubert N2AU at 1400 and other times on 28885. Many of us have been waiting (some for a year or more) for a QSL via N2AU, and reportedly Art is too ill to fulfill this duty. I suggest that someone who knows Art step in and offer to take over the QSL handling for HH7PV. Pat says that he has received no international mail, and that situation is unlikely to change soon, so the direct QSL route given in May *Break In* magazine is unlikely to work.

Honduras: The SMIRK rig has arrived at the club station HR1CRT, and the 5-element yagi is in place. Tnx N7JJS.

Mexico: Some rare stations were active during April, working mainly into ZL/VK. One is Horst ZE1IK in Cuernavaca (EK08), a friend of Geoff XE1GE (who also continues to be quite active). Another is Juan XE1ABA in Colima (DK89), who requested QSLs to his callbook address. VK3OT advises that XE1GRR claims to be Juan's QSL manager, but many DXers have had trouble getting XE1GRR QSLs.

Emilio XE3EB is now active from two grid squares. At his home (EL51ea) he has an FT-767GX and 150-watt brick into 4 elements at 50 feet. At work (EL50ew) he currently has 10 watts into a vertical, mainly just for listening, but improvements are planned. After less than a year on 6m, he has WAC, almost 50 states, and 32 countries. Emilio disagrees with comments about mail problems in Mexico reported in the last Bulletin: 'registered mail is not necessary, and to my experience the only problem with incoming mail from the U.S. is that it now takes about 8 days when it used to take 5 some years ago. So I would say that for QSLing to Mexico any of the common practices will be fine, that is, IRCs, green stamp, or Mexican stamps. In the latter case, the current rates are: MEX\$2,000 (about 65 U.S. cents) to NA, CA, and the Caribbean; MEX\$2,500 (about 80 U.S. cents) to SA and EU; and MEX\$2,800 (about 90 U.S. cents) to AF, AS, and OC. These rates usually increase every year in December.' XE3EB QSLs go to Emilio Berny, P O Box 309, Merida, Yucatan, 97000 Mexico.

Navassa: Following the success of the KP1 operation in January, several of the operators plan a return there in December. They are seeking pledges (not money at this time) of US\$5 to Randy Rowe N0TG, 2120 Reverchon Dr., Arlington TX 76017. Include a SASE so they can notify you where to send the money, if there is sufficient interest. Tnx TDXB.

Panama: Doug ZP6CW has been trying to find a QSL route for HP1XSO, who was briefly active a year ago. His name is Serafin Martinez, and it's believed he is back in the U.S.; could someone with a name-organized call directory please check this and see if they can find a U.S. callsign?

Puerto Rico: Tim KP4BZ is quite active on 6m lately (even working your editor via Long Path), running 100 watts into a vertical. His address is Tim Wininger, Marinas Tower 1 Ap. 2802, Fajardo, PR 00738.

St.Kitts: Craig V47ITU (WB7RFA) was briefly active with a borrowed 6m rig in March. That rig is now gone, and he enjoyed the Magic Band, so he is looking for another rig and maybe an amplifier. Some sources say his QSLs can go

to his home call, or try direct to Craig Maxey, Box 608, Basseterre, St. Kitts, Leeward Islands. Tnx AA7EA and TDXB.

San Andres and Providencia: Jim HK0/W6JKV operated here from April 1 to 12, giving many folks a new one (including K6QXY's #100). QSLs go to Jim Treybig, 27200 Altamont Road, Los Altos Hills, CA 94022 USA.

United States: Pat W5OZI is making plans for his annual grid-pedition. He hopes to be located at the exact intersection of grids DL79, DL89, DM70, and DM80, providing credit for four grids with a single QSO. Per Rule 4(a) of VUCC rules, he will arrange for precision surveying. This operation will take place on June 25-30; frequencies will be 50.125 and 144.200 plus/minus. QSL via Pat Rose, Box 393, Junction TX 76849 (SASE appreciated).

Larry N0LL will activate EM08 on May 23 for the Sprint.

John N8UM will activate EM85 with 400 watts on 6m every Sunday morning from 1100-1500z. The location will be on a 2200' ridge on the western slope of the Great Smoky Mountain National Park in Tennessee. He is also looking for skeds, especially for the June ARRL VHF QSO Party, with all bands 50-432 MHz. QSL to John Baranyl, 1126 W. Outer Drive, Oak Ridge TN 37830. Tnx SWOT.

NEWS OF SOUTH AMERICA

Bolivia: Judy CP6AK has been reached via landline by W3XO/5, and on April 12 she copied some Texas stations weakly on 6m. She says she is active on 28393 mornings, and on 21390 at 1800-2200 daily; also, she has been coming up on 28885 for 6m liaison. Her operation is SSB only, and centered on 50.110. At present the only available antenna is the AR-6 vertical, but that may be the best in light of the fact that she is in the geomagnetic equatorial mystery zone where there seems to be no direct U.S. propagation (ZP6CW, similarly situated, has never had a direct U.S. opening, only sidescatter). On April 15, she worked into ZL about 2030.

Brazil: No reports have been received of activity by PP8ZCB (write-up last issue). Meanwhile, some checking showed that Manaus would not be locator GI70, but instead it is at the intersection of FI96, FI97, GI06, and GI07.

Jose PY2DJC has moved, and here is his new QSL address: Jose Carlos Pereira, Rua Dos Faisos, 500, S. Bernardo Do Campo - SP, 09860 Brasil. Tnx G4UPS.

Chile: New on 6m is Fernando CE6HEP. His address (not in the Callbook) is P.O.Box 1234, Temuco, Chile. Tnx W5FF.

Easter Island: An official change has been made in call-signs for Easter, so that the suffix will always begin with Y. Thus, CE0DFL is now CE0YFL. Tnx AA6TT.

Fernando de Noronha: Briefly active here in March was PY0FZ. QSLs go via PY7ZZ.

Juan Fernandez: CE0ZIS, who is resident on Robinson Crusoe Island (FF06) until the end of this year, has shown up on 6m at least once. He is using the 6m yagi left on the island by CE3BFZ after the CE0ZZZ DXpedition last year. Tnx Pedro.

Peru: Darroll Lockhart OA8ABT is back in the U.S. now, and no further operation from Peru is expected (this is suddenly a very rare country!). If you still need a QSL from

his past operations, you can reach him via his family at: Route 1, Box 330, Goshen NY 10924. Tnx K5ZMS.

San Felix: John XQ0X was expected to return to the mainland about April 17, as the lobster-fishing season comes to an end. He will return again in October or November for another 4-5 months. He has been moderately active on 6m in evenings this season but unfortunately hasn't caught any stateside propagation. Tnx CE3BFZ.

South Georgia: VP8CGK now has a TS680, but still needs a 6m antenna. Tnx JA1BK.

South Sandwich: VP8SSI was a no-show on 6m and 2m, yielding to HF operations in the severe weather. It seems they got the 6m yagi assembled, then left it on the ground overnight. By the next day it was frozen solid to the ground, and could not be pried free!

NEWS OF ANTARCTICA

Antarctica: Eric F1JKK has canceled his plans to operate here as an FT4. Tnx GJ4ICD.

NEWS OF EUROPE

Bulgaria: LZ1ZP (the son of the VHF manager LZ1AG) has requested a few receive converters so that cross-band operation can take place. The LZs are interested in 6m, but at present the band is occupied by taxis, fire services, etc. Tnx GJ4ICD.

European Russian Republic: More on RA3TA: this is the station of Moscow University. It is situated on the 24th floor of a building, in locator KO85sq. Tnx VK3OT. Andy RA3TES has been active since January with 10 watts to a dipole. His locator is LO15jw, and QSLs go direct to Andy Kamaev, Box 13-A, Arzamas 607220, Russia. Tnx G4UPS. Andy has been heard to confess that he has no specific permit for 6m, and it was only his enthusiasm that made him press his PTT on 6m; you figure this out. Tnx 9H5EE.

France: Jean F6IXI was recently active using the special callsign TM6CHU from Chausey Island, off the west coast of France, locator IN96cu or IN98cu (two sources differ). QSL to his home QTH: Jean Claude Bernard, 2, Chemin d'une Ruelle A L Autre, F-95300 Pontoise, France. Tnx G4UPS and 9H5EE.

Germany: Mike (ex-ZD8MB) is now in Germany and hopes to be on 6m in time for E_s season as DA2AB. His QSL route is Mike Barry, Karl Millocker Str 10, Wickede, 4600 Dortmund 13, Germany. Mike, in a letter to G4UPS, says that 600 6m permits have been issued in Germany, including 5 for British Forces there. The allocated spectrum is 50.080-50.400, maximum 25 watts ERP, horizontal polarization only, CW and SSB. On March 20 at 0918, August DK5UG (JN49em) scored the first D-KH6 contact, working your editor (BK29mo) on 50.102 CW via the long path; neither station heard any other L-P signals during this opening.

Poland: Per 9H5EE, SP's were to have begun 6m activity beginning March 10.

Sovereign Military Order of Malta: 1A0KM may be difficult to work in the future. Rumors from Italy suggest that the Knights of Malta were not happy with the disruption caused by the last 1A0KM operation, and have said that they will no longer permit amateur radio operations there. Tnx TDXB.

Spain: Directly from Vicente EA5AN, here are the details of Spain's 6m status. The administration accepted applications for 6m permits from January 11 to March 11, and then it had 45 days to respond to those applications. This would mean that all such permits will have been issued by April 26. There is a limit of one 6m permit for every 500 licensed EA amateurs! The official resolution states that acceptable modes are A1A and A3E, meaning CW and AM (not SSB), but one hopes this is an error. Vicente notes that some EA stations, without reading the resolution, have asked their U.R.E. (Spanish radio amateur's union) about 6m, and may have received the simple answer "Yes, we have that band, so you can transmit." So the best solution for determining which EA's are legal will be a list of them, and such a list will certainly be published in this Bulletin ASAP. EA5AN can be reached at: Vicente Sanjuan, Calle Sevilla, 13, Valencia, Spain. Tnx VP2ML.

Also, AA6TT forwarded a copy of page 45 of the Edicion Espanola of CQ, February issue. Without understanding the language, it is clear that this is a resolution by the Direccion General de Telecomunicaciones, dated 1991 December 4 regarding 6m in Spain. It mentions a 30-watt limit on A1A and A3E, with band limits 50.000-50.200 MHz. Tnx Bill.

Wales: Steve Jones GM0GEI, who has given many DX stations their first GM on 6m, has recently moved to Anglesey in North Wales, and when he gets settled in will be active as GW0GEI. In the meantime he can be contacted at Llainwen, Llansair N.B., Near Caergeillo, Holyhead, North Wales LL65 3HL. Tnx G4UPS.

Yugoslavia: a quote from *QST Canada* for 1992 March: 'DOC has announced that Canada now has a reciprocal operating agreement with the Republic of Slovenia. Until recently, Slovenia was part of Yugoslavia. Prefixes currently in use: YT3, YU3, YZ3, and 4N3. CRRL has been advised that Slovenia now has its own QSL bureau. Send cards to Zveza Radioamaterjev Slovenije, Lepi pot 6, Box 180, 61001 Ljubljana, Slovenija.' Will DXCC status be next? And what about Bosnia-Hercegovina? Stay tuned!

NEWS OF AFRICA

Benin: TY1ABE was worked by some Malta stations in early April. This is apparently the first 6m activity from TY, but no other details are available. Tnx PY5CC.

Botswana: Dave Heil (ex-9L1US) will commence activity here as A22US beginning in early April; locator KG25. QSLs go via WA8JOC. Tnx W1AW, 9H5EE, and TDXB.

Chagos: Jason VQ9JY, newly arrived here, pulled the allegedly inoperative Swan 250 out of mothballs, put up a dipole, and promptly worked some JA6s around March 10 or 11. The 3-element yagi which N6CW had donated along with the Swan is nowhere to be found. Jason's QSL route is via his home call KB7CDA. Another operator there who has expressed interest in 6m is VQ9YA. Tnx N6CW. VQ9JT has also been reported active.

Lesotho: Ray 7P8SR, a permanent resident in KG31, is QRV on 6m with an IC575H provided by ZS6WB, running 100 watts into an M² 5-element yagi. QSLs go to Ray Schenkweiler, P.O. Box 333, Maseru 100, Lesotho. Tnx ZS6WB and G4UPS.

Madeira: More details of Cedric CT3FT. He returns to the U.K. (as GI3IVJ) on May 1, and will be back in Porto Santo (IM13) in November. His direct QSL route is C. J. Rourke, Box 86, Porto Santos Isl, Madeira, P9400

Portugal. Tnx G4UPS.

Malawi: Because so many QSL cards sent direct to Ron 7Q7RM have got lost in the postal system, he has decided to use a U.K. QSL manager for his cards. For all contacts since 1992 January 1, send cards to G0IAS: Mr. A. R. Hickman, The Conifers, High St., Elkesley, Retford, Nottingham DN22 8AJ, England, U.K. G0IAS is also the manager for Les 7Q7LA (KH75). For all W and VE contacts made by 7Q7RM in 1991 October/November, Ron has sent cards to G4UPS, from whom they can be extracted: Mr. Ted Collins, 27, Parklands, Hemyock, Devon EX15 3RY, England, U.K. On 1992 February 16 Joe N2AVR became the manager for Colin 7Q7CM. Tnx G4UPS. John 7Q7JL and Ron 7Q7RM were once more in KH75 as 7Q7JWL for a few days. QSL via G0IAS. Tnx 9H5EE. Kay 7Q7XX (ex-AA6VR and JH1ORL) is now active in Mponela/Dowa (KH66), which is 70 km from Lilongwe and some 400 km north of Blantyre. He is there for the next 2 years with an FT680, 50 watts, and 4-element yagi. He sometimes runs a keyer on 50.0900, and his QSL route is via JH3RRA. Tnx 9H5EE. For those willing to risk the mail losses, W5OZI confirms the direct addresses for 7Q7JL and 7Q7RM given in recent Bulletins, and he provides this new direct address for 7Q7RM: Colin Morgan, P.O. Box 51491, Blantyre, Malawi. Grids for 7Q7CM, JL, and RM are all KH74. Tnx W5OZI.

Mayotte: FH4AA is active on 6m with 15 watts into 5 elements, from April 13 to 28. The operator is F6ECS, and QSLs go to his home address. In his first couple of days he worked some Mediterranean stations on 6m. Tnx ZS6WB.

Morocco: A new callsign showed up here recently: CN8HD. No further info. Tnx ZS6WB.

Niger: Some JA operators are expected to be QRV soon from 5U; no other details yet. Tnx JA3EGE.

St. Helena: Chuck ZD7CRC, a missionary from South Africa, is active here on 6m with a 10-watt rig and a 5-element beam, which will basically remain pointed northward. He is inexperienced with DX, and will probably use SSB only, monitoring 50.110. He has shown up on 28885 as well. Tnx ZS6WB. In cycle 21, St. Helena was worked by VK4's via the long path, no less.

South Africa: ZS6YA/5 will be QRV from KG51 and KG61 for about ten days beginning April 27. He will have 150 watts and 5 elements, and will liaise on 28885, particularly looking for Oceania and South America. Tnx ZS6WB.

Tanzania: Masa 5H3RA (ex-JA3RAR) is active in Dar Es Salaam (KI93) until spring 1993. On February 16 he worked Malta. QSL via JA3PAU. Tnx 9H5EE.

Western Sahara: Naama S01A's locator is IL56fi, and his QSL manager is Arseli EA2JG. Tnx G4UPS. Also, another callsign popped up here recently: S01MZ, but no details. Tnx ZS6WB.

Zambia: Some JA operators are expected to be QRV soon from 9J; no other details yet. Tnx JA3EGE. Peter 9J2HN has not been active on 6m recently due to lightning damage to the power supply. He was due to return to Japan in April, his tour being completed, but he has requested a 12-month extension. So he will take a few weeks' leave in April, then return to Zambia for another year. Tnx G4UPS.

Zimbabwe: Rodney Z21AFR is active; his spelling of the country name is Jimbobwe. There is some confusion about his locator: he gives it as KG59tu, which would be 20°09'S/31°38'E, but then says the coordinates are 20°12'S/28°34'E, which would be KG49gt. Tnx 9H5EE.

BEACON NEWS

Argentina: A new beacon was heard occasionally starting March 16, sending 'V V DE LU8DCH' followed by a short dash, and a 3-second pause. The frequency is 50.0804, and operation does not appear to be continuous, as is the case with all LU/CX beacons.

Aruba: A new beacon, P43AS, was spotted on March 25 by ZL2CD, on a frequency of 50.0516. No further details.

Australia: Rex VK8RH has acquired a number of Philips SM828 25-watt midband (80 MHz) mobile FM transceivers, made redundant by the Australian changeover from 25 kHz to 12.5 kHz NBFM. These are readily modified for 6m beacon use, and Rex is mass-producing identifier boards to go with them. He will be providing one such beacon for Alice Springs, presumably on 50.047 signing VK8RAS/b. That allocation has been listed for years but had never been activated. It would also be nice to have one installed in the northwestern corner of VK6. Also Rex is expecting to provide beacons for China, Indonesia, and Kuwait (see those items below), and possibly Nauru. Three cheers for Rex!

Azores: Per ZS6WB, the CUBURA/b appears to be mostly or completely inactive.

Canada: Ken VE3FIT is constructing a new beacon, to be sited 15 miles east of Toronto, in FN03. It will have 10 watts to a turnstile, on a frequency of 50.059.

China: Ron VK4BRG is contacting Kang BZ4SAA to ascertain whether he can host a 6m beacon, which has been proffered by VK8RH.

Dominican Republic: Despite the departure of Aki HI8A, the HI0VHF machine which he set up continues operational on 50.0087. Does anyone know who is now the caretaker?

Easter Island: Randy N7JJS/5 is checking with N4LTA to see what can be done to supply a 6m beacon for CE0Y.

Gibraltar: ZB2VHF/b, which has not been on the air very much, will soon be moved to a new site, and shifted "a couple of kHz due to causing QRM," per a phone call from ZB0T to GJ4ICD. Let's hope it doesn't end up underneath ZD8VHF/b, V73AT/b, or FY7THF/b!

Greece: Costas SV1DH will move his SZ2DH beacon to SV5 or SV9 when the permits are issued. Tnx GJ4ICD.

Indonesia: Rex VK8RH is in contact with YC0UVO with the intention of supplying a beacon to Frank.

Kuwait: The new 9K2SIX/b, with 25 watts on 50.0415, is ready to be shipped to Kuwait as soon as the crystal arrives at VK8RH.

Malawi: 7Q7XX has been running his keyer on 50.0900, and it has been copied by stations as distant as V73AT and NI6E/KH6. It sends "VVV DE 7Q7XX/B 7Q7XX/B" at a brisk pace.

Namibia: Per GJ4ICD, the V51VHF/b went QRT on March 22 due to equipment problems. But on March 30, G4UPS noted that V51DM is now running his own keyer on that frequency.

Netherlands Antilles: The PJ2SIX/b mentioned last issue has been noted on 50.006-.0065, intermittently, during March (but no reports in April). The locator is FK52kg, and it runs 20 watts into 2 crossed dipoles; the keeper is PJ2BR. Tnx G4UPS.

In addition, Chet PJ9EE says that his long-awaited PJ4B machine has been cured of its spurious emissions, and is QRV 24 hours/day on 50.015. It is FSK mode, running 21 watts to a triple stack of horizontally-polarized omnidirectional bays. Nobody is reporting it yet, though.

Papua-New Guinea: P29BPL has returned to the air on its new frequency of 50.0195. It is running 12 watts into a quarter-wave vertical, temporarily situated at P29PL's QTH, where operation will be intermittent. Rick P29ZFS is constructing a 2-dB gain omnidirectional antenna which will be mounted atop a 40-foot tower from a nearby plateau, at 1000 feet ASL, with a clear shot in all directions. However, the beacon frequency may have to be changed to avoid its 3rd harmonic getting into a repeater. The keyer was supplied by Rex VK8RH, and it will eventually drive a beacon on 146.450 MHz synchronously with the 6m beacon. Its message is "P29BPL QTH PORT MORESBY Q130 K." Reports go to Paul Linsley P29PL, P.O.Box 559, Badili, NCD, P.N.G. Rex may also provide a beacon keyer for P29CW.

Sierra Leone: PY5CC, G4UPS, and VK4BRG have all independently concluded that the 9L1SL/b is off the air, a pity since that was a prime band-opener for the VK4-to-West Africa long path.

South Africa: ZS5SIX/b (50.321) is off the air until further notice. Tnx KG6DX. Also, the ZS6DN/b on 50.0551 has been shut down indefinitely. The other ZS6DN/b on 50.050 continues active, but it is basically just a carrier (in a band that is often filled with carriers) with a low-modulation AM-mode identification every five minutes. Tnx ZS6WB.

South Cook: Victor, ZK1CG, has transferred the FT620B and amplifier donated by N6AMG, et.al. to Stuart Kingan, ZK1AA, who has set about getting it back on the air. You may remember that ZK1AA ran a six meter beacon two solar cycles ago. Apparently the KLM 661 shipped to ZK1CG by VK3OT for beacon use never arrived, and the antenna was damaged during a recent storm.

United States: Greg WB9STR has a new 24-hour beacon on 50.0715. It transmits "WB9STR/B EN61 IL" from Bourbonnais, Illinois at 41°10'40"N/87°53'01"W. It runs 5 watts into a turnstile at 130 feet. QSL to Greg Hart, P.O.Box 533, Bradley IL 60915. Tnx KA3B.

Great Circle Distance/Bearing Program by the Mad Hacker

PROGRAM GEODESIC

Program compares short great circle distance and bearing determined by spherical & oblate spheroid

DATA R2D,RE,P1/57.29578,6370.0,3.1415926/

DATA A,FLAT/6378.155,298.3/

100 WRITE(*,105)

105 FORMAT(' GEODESIC PROGRAM ')

107 WRITE(*,110)

110 FORMAT(' Enter Lat, Long (Deg N, E) Station 1')

```

READ(*,*,END=199) SLAT,SLONG
IF(SLAT.GT.90.0.OR.SLAT.LT.-90.0) GOTO 199
112 WRITE(*,115)
115 FORMAT(' Enter Lat, Long (Deg N, E) Station 2')
READ(*,*,END=199) TLAT,TLONG
IF(TLAT.GT.90.0.OR.TLAT.LT.-90.0) GOTO 199
DEL = (SLONG - TLONG) / R2D
IF(DEL.GT. PI) DEL=2.0*PI-DEL
IF(DEL.LT.-PI) DEL=2.0*PI+DEL
CALL GRTCIR(DSPH,SLAT/R2D,TLAT/R2D,DEL,ALFO,BETO,1)
BEAR = ALFO * R2D
IF(BEAR.LT.0.) BEAR=BEAR+360.
RBEAR = BETO * R2D
IF(RBEAR.LT.0.) RBEAR=RBEAR+360.
DIST = DSPH * RE
WRITE(*,125)
125 FORMAT(' 6370 km spherical earth approx. ')
WRITE(*,145) DIST,BEAR,RBEAR
145 FORMAT(' Distances=',F8.1,' Bearing=',F8.2,
1      ' Rev. Bearings=',F8.2)
CALL SPHEROID(SLAT/R2D,SLOC,RS)
CALL SPHEROID(TLAT/R2D,TLOC,RT)
CALL GRTCIR(DC,SLOC,TLOC,DEL,ALF,BET,1)
C Determine geocentric radii in middle of 50 pieces
D100 = DC/100.
RSUM = 0.0
DO 169 J=1,99,2
  D = FLOAT(J) * D100
  CALL GRTCIR(D,SLOC,PLOC,PDEL,ALF,PBET,2)
  RA=(1.0-SIN(PLOC))**2/FLAT*(1.0+.375/FLAT)
  RSUM = RSUM + R
169 CONTINUE
RAVG = RSUM/50.0
DIST = RAVG * DC
BEAR = R2D * ALF
IF(BEAR.LT.0.) BEAR=BEAR+360.
RBEAR = R2D * BET
IF(RBEAR.LT.0.) RBEAR=RBEAR+360.
WRITE(*,171) RAVG
171 FORMAT(' Oblate spheroid approx., RAVG=',F9.3)
WRITE(*,145) DIST,BEAR,RBEAR
WRITE(*,175)
175 FORMAT(' New Station 1?, Enter 1; New Station 2?, '
1      ' Enter 2')
READ(*,*) IENTER
IF(IENTER.EQ.1) GOTO 107
IF(IENTER.EQ.2) GOTO 112
199 STOP
END
SUBROUTINE GRTCIR(D,A,B,DEL,ALF,BET,N)
DATA PI,PIOV2/3.1415926,1.570796/
GO TO (1,2),N
1 D = AACOS((SIN(A)*SIN(B)+COS(A)*COS(B)*COS(DEL)))
ALF = AACOS((SIN(B)-COS(D)*SIN(A))/(SIN(D)*COS(A)))
BET = AACOS((SIN(A)-COS(D)*SIN(B))/(SIN(D)*COS(B)))
ALF = -SIGN(ALF,DEL)
BET = SIGN(BET,DEL)
RETURN
2 B = ASIN(COS(D)*SIN(A)+SIN(D)*COS(A)*COS(ALF))
BET = AACOS((SIN(A)-COS(D)*SIN(B))/(SIN(D)*COS(B)))
IF(B.GT.PIOV2) GO TO 4
IF(B.LT.-PIOV2) GO TO 4
DEL = -ASIN(SIN(D)*SIN(ALF)/COS(B))
TEST = COS(D) - SIN(A) * SIN(B)
IF(TEST)5,5,6
5 DEL = -PI-DEL
6 RETURN
4 DEL = PI
RETURN
END
SUBROUTINE SPHEROID(GEODET,GEOCEN,R)
DATA A,B,FLAT/6378.155,6356.773,298.3/
GEOCEN = ATAN(B*B*TAN(GEODET)/(A*A))
R = A*(1.0-SIN(GEODET)**2/FLAT
+ 0.625*SIN(2.0*GEODET)**2/FLAT**2)
RETURN
END
FUNCTION AACOS(COSF)
IF(COSF.GE.1.0) AACOS=0.0
IF(COSF.LE.-1.0) AACOS=3.1415926
IF(ABS(COSF).LT.1.0) AACOS=AACOS(COSF)
RETURN
END

```